

AVIATION

The Oldest American Aeronautical Magazine

JANUARY 24, 1927

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VOLUME
XXII

SPECIAL FEATURES

NUMBER
4

ASTONISHING AIR MAIL BIDS
COMMERCIAL AVIATION—BY LOUIS BREQUET
THE AIR-KING

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With the Editor

The hole in the Trans-Continental Air Mail Service have attracted a very great deal of attention. If the opinion of the editors as to the cost of operating air transportation are really expressed in their respective hole then there is material for much thought contained in the editor's pen (and) called for. In this connection, however, it is extremely interesting to have the opinion and ideas of an authoritative representative of former air transportation activities. M. Louis Braguet, the well-known French aircraft constructor, has long maintained the closest contact with successful aviation activities throughout the World and while he has not been personally identified with any actual air transport operations, he has, by his frequent verbal and published statements, indicated his close acquaintance with air transport problems. M. Braguet finds before this submission of his contribution, much as is contained in Europe, cannot be adequately and for this reason he is giving careful consideration to the actual work involved, with a view to determining to what extent and under what conditions air transport can be made to pay its own way. That this great French airplane constructor is already engaged in preparing plans for what he considers to be the air line of the future may indicate his extensive knowledge of existing the field of successful air transportation, but whether there is so or not ten views and deductions on the general subject of making air travel pay its way, even though these deductions be in terms of French units, should be of the greatest interest to American operators.

In 1926 WRIGHT WHIRLWIND ENGINES Flew More Than 1,750,000 MILES

In Commercial and Private Airplanes

Whirlwinds Have In 1926:

In Competition

Made first North Pole flight by Commander Richard Byrd in Fokker Longhorn plane.

Won 1st place Annual Reliability Test of 2,113 miles in Traveler plane carrying 400 lbs. payload, average speed 124 1/2 m.p.h.

Won 2nd place Annual Reliability Test in Buhl Versatile Aircar carrying 400 lbs. payload, average speed 121 1/2 m.p.h.

Won 3rd place Annual Reliability Test in Dornier "Deutscher" carrying 640 lbs. payload, average speed 120 1/2 m.p.h.

Won Transport Race for Detroit News Air Transport Trophy at Philadelphia in Wright-Bellanca carrying 1,680 lbs. payload at 121 1/2 m.p.h.

Won Light Commercial Race at Philadelphia carrying 1,015 lbs. payload at 121 1/2 m.p.h.

Won 17 aerial "lightest-day" competitions at Philadelphia.

Won 5 First Prizes at Denver Mile High Air Meet in Ryan 3C.

Made Non-stop, Portland, Oregon to Los Angeles flight 1,015 miles in Ryan 3C motor in Ryan 3C-1000 airplane of Pacific Air Transport.

Carried 2,660 lbs. payload at Philadelphia at 121 1/2 m.p.h. in the Ryan 3C, registered address held by the Ryan Motor Company.

In Daily Service Flown for

Philadelphia Rapid Transit Company—155,958 engine miles with 875 55 cent per engine hour averaging 11 1/2 gals. fuel per engine hour at 121 1/2 m.p.h. in Philadelphia.

These performances compare to pilots
the Wright Whirlwind, 200 H.P. Air-Cooled engine for

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More Pilots fly them!

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Washington, Norfolk, using 21 WHIRLWINDS each, served as Fokker planes.

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Colonial Air Transport—49,000 miles with 825 cent of engine parts on their 121 mile route New York to Boston, using 4 WHIRLWINDS exclusively in the route in Fokker and Curtiss planes and 1 in their Fokker Air Line.

Pacific Air Transport—121,700 miles on their 1,121 mile route Los Angeles to Seattle using 4 WHIRLWINDS exclusively in Ryan and Dornier Air planes.

Northeast Airways since October—16,000 miles on their route 377 miles Chicago to Philadelphia using WHIRLWINDS exclusively in Dornier "Deutscher".

National Air Transport—16,000 engine miles in post equipment for their 907 mile route Chicago to Dallas in Traveler Air, Ford—5 engine plane and Wright Bellanca.

Territorial Airways—14,000 miles in post equipment, on their 807 mile route Atlanta to Miami using 4 WHIRLWINDS in Stearns and Curtiss planes. Carried 140,000 lbs. currency into Miami, Cuba within the day after the evacuation, in Boston "Deutscher".

Canadian Air Transport 45,710 miles on their route to Red Lake, Canada, using 3 WHIRLWINDS exclusively in Stearns "Deutscher" and Curtiss Lark.

Half-Dated, Dunlop, Dornier Aero Expressions, Charles Davidson, Henry Dupont at Wilmington and Fresno, California and American Pacific Company, Denver & Rockingham of Alaska, Central Canada Airlines, British Air Lines of Canada and many others.

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No. 4

The Five Year Program Cut

THE DISHEARTENING news comes from Washington that the first year of the much applauded five-year program for Government aviation will not bring with them the progress the public was led to expect. As a well-known, the whole country was in a state of great uncertainty in 1925 over the apparent neglect of our military and naval aviation. The President's Aircraft Board, known as the Morrow Board, from the name of its chairman, informed the public that a change of policy was needed and made recommendations. President Coolidge approved the recommendations, so the Congress, by passing a law embodying the plan. The new Secretary for Air was appointed and everyone believed that, at last, direction, criticism and incentives would be to only measures of a very disconcerting period. Being, as these measures, the aircraft manufacturers and operators called on the President, just before Christmas, to express to him their appreciation of the interest he had shown in the aviation program in his message to Congress. This was before it was known how the Army and Navy budgets had been altered in the office of the Budget Director.

Suddenly, it was learned that the Five Year Program for the Army had been curtailed by 45 hundred planes. That was not so unexpected for the development of business has met with great setbacks. But when it was learned that the Navy program had been cut from 313 aircraft of different types to 165, indignation and resentment were heard not only in Congress but wherever successful matters were discussed.

The playing of the three will be one of these difficult problems that require a very complete and unbiased study of the whole procedure of making appropriations. Unpleasant remarks have been made when they are considered dispassionately the result appears to be that the blame can fairly be placed on the system of carrying out other projects of Congress. If we are to have the advantages of a budget system, we must suffer from some of the shortcomings. And as long as we have no separate budget for our Government aviation we will have to suffer the penalty of having air appropriations mixed with Army and Navy appropriations.

It is difficult to agree with the nation's will, not just, nor would that the program for aircraft in the Navy be cut 50 per cent while the whole appropriation for the Navy, for instance is only curtailed 35 per cent.

Next year—Presidential election year—will probably bring new reasons for curtailment. It may be too late, as it usually is the case, to make changes this year. But this is in the context of the five year program must be filled next year if it takes another upheaval.

The Oldest American Aeronautical Magazine

The Canadian Market

IN SPITE of its small population, Canada offers an excellent field for aerial development. In her country there are great areas through which it will probably be as profitable to run a railroad but which could be opened up to a very great extent by airlines. There are vast unpopulated districts and a continuous opportunity for forest patrolling and timber cruising. By air, the Canadian wilderness takes on an entirely new aspect and wealthy sportsmen will go into the bushing country by this method in increasing numbers. Logically, therefore, Canada should offer as good a market for American aeronautical products as it does for automotive products but there are several factors which materially alter the situation.

Transportation in a country of which large areas are undeveloped must almost inevitably be fostered by subsidy. Canada extended its railroad system into districts where it was impossible for an operating profit to be made until many years of operation had passed. The present value of the land opened up has many times than made up for the operating loss of the railroads but the deficit has had to be made up by indirect methods. In the same way, it seems that it is extremely difficult for a private airline to operate successfully in Canada without outside help. In spite of the fact that the indirect value of the airline may be enormous. And where the Government operates the airlines it is only to be expected that the products of the home country will, in general, form the equipment employed. At the present time flying in Canada is mostly in the hands of the Government and, accordingly, Canadian or British built airplanes are in the greatest demand.

Although the present tendency is in this direction there is reason to expect a serious development of privately owned aeronautical enterprises in Canada and as American planes are likely to be attractive from the standpoint of price in the Canadian market, many planes will probably be made in the United States. Canada has been extremely far in adopting American aircraft but it is only within the last few years that American manufacturers have been building real commercial planes and the home demand has been very considerable. Furthermore, Canada needs airplanes and planes equipped with skins for winter flying, neither of which products in the commercial class have been developed to any considerable extent in this country. The market, however, is potentially there and deserves consideration for the future.

Nor should the future be regarded as very far off. There is little doubt that the rapid development of aerial service in the United States will have its effect upon air development in Canada, especially as the natural features of the two countries are so similar.

the actual weight of engine group (4) is about 418 lb. 138 lb. per hp. The weight of the plane structure has been decreased to about 25 per cent of the total weight.

Thus for my plane, the Dugout 10, type "Bessie", which holds the record for long distance flight and of which the designer is not as well-known as that of a commercial plane, the weight is about 5,000 lb., the air resistance about 15 per cent and the weight of the plane without engine only about 20 per cent of the total weight fully loaded. Certain engines mounted on this airplane have obtained, as the course of flights of more than thirty hours duration without a landing, an average consumption of between 228 and 260 gr. per hp. per hour flown. Although these figures, in the present state of our technical knowledge of the question, may be considered as most satisfactory, it should be noted that they apply to standard planes and under particularly safe conditions and not loaded as might have been supposed to place speedily equipped for these performances.

The same figures apply to my Immature plane, adapted from an earlier model and intended especially for commercial flights, with the difference, however, that with the Immature (not heavily loaded and consequently having a better coefficient of security) the weight of the airplane structure approaches a slightly higher percentage (25% to 25%+) of the total weight.

These figures indicate the very considerable progress made recently and which the great upcoming flights scheduled during 1926 have proved conclusively. The future, however, will certainly see a still greater advance made in this field.

From the point of view of commercial aviation the above mentioned improvements will allow approximately the following gains to be made by commercial planes:

- 71% on air resistance of the plane;
- 125% on the fuel consumption of the engine;
- 25% on the specific weight of the engine;
- 21% on the lightness of construction of the airplane.

The above gains added together render an appreciable reduction of the cost price of air lines, at the present time extremely possible.

To indicate the same clearly I have summed up in the following table the figures arrived at in calculating the cost price per kilometre for an aircraft carried in certain specific instances.

The figures given apply to engine ranging 125 hp. per hp. to a plane having a total weight of 5,000 lb., with a diving

speed when loaded of about 100 kmph., and to no-stop flights of between 1,000 and 1,500 km. These distances are decidedly larger than those of passenger and freight planes used in 1915.

Length of non-stop flights	Lightness coefficient	Air resistance	Engine consumption	Weight of engine group	Cost price per kilometre flown
1,000-1,500 km.	0.02-0.03	0.01-0.02	0.01-0.02	0.01-0.02	0.01-0.02
1,000-1,500 km.	0.02-0.03	0.01-0.02	0.01-0.02	0.01-0.02	0.01-0.02
1,000-1,500 km.	0.02-0.03	0.01-0.02	0.01-0.02	0.01-0.02	0.01-0.02
1,000-1,500 km.	0.02-0.03	0.01-0.02	0.01-0.02	0.01-0.02	0.01-0.02
1,000-1,500 km.	0.02-0.03	0.01-0.02	0.01-0.02	0.01-0.02	0.01-0.02
1,000-1,500 km.	0.02-0.03	0.01-0.02	0.01-0.02	0.01-0.02	0.01-0.02
1,000-1,500 km.	0.02-0.03	0.01-0.02	0.01-0.02	0.01-0.02	0.01-0.02
1,000-1,500 km.	0.02-0.03	0.01-0.02	0.01-0.02	0.01-0.02	0.01-0.02
1,000-1,500 km.	0.02-0.03	0.01-0.02	0.01-0.02	0.01-0.02	0.01-0.02
1,000-1,500 km.	0.02-0.03	0.01-0.02	0.01-0.02	0.01-0.02	0.01-0.02

The cost price shown on the preceding table is calculated allowing for existing conditions of speed and dependence on engine and airplane. The increased durability of both engine and airplane structure would permit a still further improvement on the figures given.

The figures for the lightness of construction, which correspond to 0.02-0.03; 0.02-0.03, apply, as I have pointed out before, to what may be considered as the present state of the aircraft design planes. Compared with the figures for 1915, for flights twice as short, the very decided progress made since that becomes evident.

The same encouraging figures, which correspond to 0.02-0.03; 0.02-0.03, apply, on the other hand, to machines which are superior to any actually built at the present time but whose construction may already be considered as about to be the plane in the near future.

The table shows that with certain improvements especially in the lightness of construction (4) of airplane, in the specific consumption (5) of the engine, and especially in the air resistance of the airplane (1) it would be possible to obtain for non-stop flights of 1,000 and 1,500 km., a cost price per kilometre far exceeded almost solely with that of the fastest ordinary means of transportation by air or otherwise. At the same time the air line would have the benefit deriving from a faster service and consequently greater time to the customer, a factor which in certain cases would prove immensely valuable.

In connection with this it is necessary for me to insist on one point concerning which people sometimes like to mistake about. The value of greater speed in transportation is increasingly adapted to the present time. The rhythm of our industrial civilization renders it essential. Thus, all methods of rapid transportation seek to make one another. At the same time the demand both of the means required and of the service rendered from the least in the various fields. This constant limit, what one might call "an economic limit of speed," corresponds to the maximum of the cost of transportation by that method. When one exceeds this limit in going along a line of transportation the expense becomes greatly very rapidly in proportion to the increase of speed obtained, and the price rapidly becomes prohibitively high. In this respect air transportation has the calculated advantage over all traffic that its economic level of speed is almost invariably higher than those of other means of transportation and locomotion.

For distances of between 1,000 and 1,500 km. (practically average transatlantic service) at an average speed of 50 km. p. h. This is already higher than the economic speed limit. The latest planes, on the other hand, are able to obtain an average speed of 200 km. p. h., as shown by the long distance flights of 1925 which were made at over six times distances than the order of average times. This high speed is, as a matter of fact, where commercial planes are concerned, by far more than sufficient, in other words that it which they may be expected to be the best advantage.

This particular and characteristic advantage of the airplane as a means of transportation is one of the best factors for the future development of commercial aviation.

In order to take this subject, advantage of the best factor in rapid transportation it is necessary that the distances between landing stages should be as long as possible.

A short investigation of the subject reveals the fact that the best solution of the plane, the specific consumption of the engine and the relative lightness of the plane structure are the essential factors in long-distance flights. The table given above shows that the more these factors are improved the greater will be the reduction in the cost price of flights over 1,000 and 1,500 km. This is true especially in the case of the farthest distance where 0.02-0.03, 0.02-0.03, and 0.02-0.03. Here the difference between the two is only 1.654-1.66 or 0.26 francs gold, in other words about 12% of the corresponding cost price. Thus, it is these three essential factors—air resistance which need be improved by all possible means.

Without needing to go too far outside the formula actually used by airplane builders, and leaving ourselves in planes weighing between 7 and 10 tons, it is possible, in a few hours, to reach a cost price of 12%, with $c=0.02$ and $c=0.15$. This represents an extraordinary space between the two limits given in the above table. But I believe it would be difficult to express here the true nature of planes of this size which are increased the consumption weight of the airplane. To do this one would have to see the head what one passed on the other. The air resistance of 27% is already a considerable one. Given a lightness of construction, it allows the value of no-stop flight, which at the present time is about 500 km. to be tripled while at the same time keeping the cost price, as shown above, down to a very interesting figure.

It is the satisfaction of these factors in airplane construction which will allow the establishment of profitable air lines between Europe, the East and the Far East, and to really assure relations between France, far contacts, and other schemes in Africa. All the great long distance flights of 1925, where the average distance was 1,500 km., and still more last year's "records" such as that of Cordes and Hynot—who made the trip Paris-Calcutta and back, a distance of 20,000 km. in three stages whose average length exceeded 1,800 km.—are the forerunners of a new era in commercial aviation. When that service the better will be freed from that chain of transfer points whose links are too close together, which form a somewhat highway to which the airplane up till now has been fettered.



The service of the future is revealed by Louis Dugout.

It is these stopping places which have caused air lines everywhere to be considered as extensions of the railway. A comparison which is thoroughly logical. These too frequent stopping places are also what obliged the companies operating air lines to conduct complicated and frequently difficult negotiations with the various foreign powers in whose territory their machines were obliged to stop for new fuel.

The great flight which have now become possible will develop commercial aviation from at least a part of these hindrances in its development. We now try to see the rapid growth of these systems of locomotion which we now know only in their embryonic form.

Let us note, however, that these no-stop flights of 1,500 km., lasting for about 30 hr., bring up another problem—that of manhood.

In order to remain in the air for 30 hours continuously we must have accommodations such as do not exist in airplanes as they are today. We must be able to sleep on board the plane. We must be able to fly after dark. Comfort and sleeping accommodations are really a question of life. Thus with machines of 7 or 8 tons passenger comfort is already quite desirable. Such planes could, as a matter of fact, have cabins in the fuselage 6 ft. high from 6 to 8 ft. wide.

As for flying by night, that is already hiding due to a certain extent in America. It is not difficult to see whether with a good plane having several engines. Although right flying conditions should not be too impossible, sleep on the plane would be a more and more frequently present all possibility, it is much easier in summer climates. There is not the sharpest doubt that, thanks to the increased security afforded by group engines, and for the use of more highly perfected instruments of navigation, night flying will be possible in the future.

We may, therefore, look forward confidently to a time, only a few years from now, when we will know comfortable airplanes, able to remain in the air for 30 hours at a time and to make non-stop flights of from 1,500 to 1,700 km., whose cost price per kilometre will, in comparison, be other words whose actual cost of operation, will be about 4 to 4.50 gold francs.

Thus an air line running between Paris and Calcutta with two or three stops on the way would cost about 1,300 gold francs per passenger (100 km.). It could, therefore, offer at a very reasonable profit, a ticket at the same price as that charged by the steamship companies for the first berth.

If we now take up the question of the flying of Europe to distant continents and that of cross-ocean flights, we must be assured to consider airplanes as a means of transport, not a means of flight, considerably longer, than those we have spoken of will now. The operation of air lines econ-



The Dugout 26 T (500 hp. Gnome Rhone 740hp) commercial air transport machine under development from the type XX



The Air-King is a low water plane produced by the National Airways System, of London, E. The engine is an OX-5.

The Air-King Four-Passenger Plane

A New Low-Powered Commercial or Private Touring Airplane Incorporating Many New Features in Its Design.

AN EXTREMELY interesting airplane in the light commercial class has recently made its appearance on the market. It is the Air-King, designed and manufactured by the National Airways System, of London, E. The plane is a very neat looking three-place twin cockpit machine with an OX-5 engine and during its preliminary test flights an emergency pilot happened to be visiting the grain with which the plane was going through its paces. It was this observer's remark to the test pilot at the conclusion of the trials, to the effect that the plane was "the King of the Air," which initiated the suggestion of naming the machine "Air-King." Soon then, a number of these planes have seen the light of day and are now in regular operation.

The Air-King is a normal airplane with two-passenger tandem cockpit. The lower span is a little greater than the upper span, since there is no under-surface and the four wing panels are able to rise.

Steel Tube Framework

The fuselage is of welded steel tube construction based on the Weyron system, in which all wires are entirely eliminated, thus making a structure which cannot in any way get out of alignment. The engine mounting is also of steel tube construction in the arrangement of which all parts of

the powerplant can easily assemble. The steel tubing employed in the entire fuselage structure is varnished both inside and out so that corrosion is eliminated. The fuselage is covered with fabric treated with weather resisting compounds.

The undercarriage is a normal Vee type with duralumin tube struts fitted with hula wood. The mainplane struts are of the same materials. The duralumin tubing is painted inside and out to resist corrosion and the finished struts are varnished with lacquer and doped with weather resistant varnish. The tail skid is a loop spring riding forward to the end of the tail post.

Duralumin Tail Unit

Duralumin is employed entirely in the construction of the tail end only, as a result of careful engineering, the weight of the whole group has been reduced to 30 lb. while the requisite single safety factor is fully maintained. Covered duralumin is employed in the stabilizer, fin and elevator framework construction and by its duralumin hinge is used in the structural edge. The spars in the tail group are perforated for purposes of reducing weight. The tail plane, covered with fabric, is braced both above and below to the fuselage by means of four sliding struts in all. The model is balanced and all control cables are made the fuselage direct to the



Another view of the low-water Air-King (Curtis OX-5)

controls in the pilot's cockpit. The aileron control cables are also locally enclosed within the lower wing structure.

One of the most novel features of the Air-King is the aileron arrangement. The ailerons work in pairs with each pair independent of the other. Upper and lower ailerons are interconnected by a duralumin strut constructed in hula wood. Control of the plane is possible with either the right or the left hand pair of ailerons, but the working of the ailerons in pairs and independently of each other is so arranged that the handling of the machine which is similar to that of any other plane with the exception that the independent operation possible is an added safety precaution upon which the manufacturer places considerable importance.

The wings, which are interchangeable, the upper half with the lower on each side, are of ash and spruce. The spars, in spruce, are of box construction. The ribs are of built up steel structure spaced 9 in. apart near the fuselage and slightly further apart toward the wing tips. The leading and trailing edges of the wings are strengthened by means of spruce strips, while shaped steel tubing strengthens the wing tips. There is a single-bay interplane bracing by means of X-type duralumin struts and the interplane wire bracing, which is of the simplest construction with safety, is of duralumin braid cable.

The radiator, which is mounted laterally below the upper wing between the aileron struts, is of the tubular honeycomb type. The fuel tank, for four hours running in as the fuselage. The propeller is a Duralumin designed especially for the OX-5 engine.

The Air-King is well adapted to all forms of private and light commercial flying. It is an excellent plane for touring and the manufacturer has given special attention to its air handling ability. The fuselage is very rigid. For Air Corps advanced training planes have been observed.

General Details

The general specifications together with the manufacturer's figures of performance are as follows:

Span, upper wing	32 ft. 11 in.
Span, lower wing	28 ft. 11 in.
Ground width	11 ft.
Height	11 ft.
Wing area	175 sq.-meter wing
Engine	OX-5
Engine power	1,000 H.P.
Weight	1,000 lb.
Speed	100 m.p.h.
Maximum speed	110 m.p.h.
Cruising speed	90 m.p.h.
Maximum climb	1,000 ft. per min.
Maximum altitude	10,000 ft.
Endurance	4 hours
Oil tank	150 gal.
Fuel tank	30 gal.

Nomenclature for Aeronautics

The nomenclature for Aeronautics presented in the S. & C. A. Report No. 104 is a revision of the last previous report on the subject (No. 101), which was issued in February, 1922.

This Nomenclature for Aeronautics was prepared by a special conference on nomenclature, aeronautics, convened by the executive committee of the National Advisory Committee for Aeronautics, at a meeting held on Aug. 26, 1924, at which meeting Dr. Joseph S. Ames was appointed chairman of said conference. The conference was composed of representatives of the National Advisory Committee for Aeronautics, and, in response to the committee's invitation specially appointed representatives officially designated by the Army Air Service, the Bureau of Aeronautics of the Navy Department, the Bureau of Standards, the American Society of Mechanical Engineers, the Society of Automotive Engineers, and the Aeronautical Chamber of Commerce.

The report extends all previous publications of the Committee on this subject. It is published for the purpose of securing greater uniformity and accuracy in the use of terms relating to aeronautics, in official documents of the Government and, as far as possible, in technical and other nomenclature publications.

A copy of this report may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

Flying in the Gold Fields

The Fitchfield Air Transport, Ltd., was organized in May, 1925, to carry on the passenger, air mail and freight service between Blantyre, Gt. Brit., and the recently discovered super-gold fields of Roan, Zulu. The enterprise consisted of one seven-seater all-metal biplane Aeromarine flying boat with 420 by Liberty engine. A regular service was maintained until Oct. 11 when the plane disappeared. Approve how back, the Odeva and Mowat, to low water quarters of Great Britain, P. Q.

Many Passengers Carried

Four loaded Liberty passenger, 2,000 lb. of freight and baggage and many thousands of air mail letters were transported without a single loss or damage to passengers or machine. Ages of passengers ranged from two years to eighty. Five hundred and twenty, and every flight was made within fifteen minutes of scheduled time. Approve how back, 30,000 passenger miles were flown. The plane was recovered and during the whole season.



Fitchfield Air Transport Co. (at Roan), Ltd.

The aerial view of Roan, P. Q., Canada. The only in the left is that caused by the clearing of a path of land to prevent forest fire from moving out the village. Roanville would be seen in the middle of the photograph.

The airplane seems to offer the only solution to this risk involved bearing North country's main passenger problem transportation. The present air route makes the trip in an average time of 10 days over a distance of 70 miles, as against 30 by a before water route and two days by the newly laid track. The means of connection, whose time is of great value, the moving can be appreciated.

The country consists of an unending fields of lakes and forests or bunk and with Roanville and it is considered that the airplane is destined to play an increasingly important part in development which is considered to be the richest mining area the world has known.

The present owners of P. Q. R. R. Roanville and Flying Engineers R. W. Chandler and G. H. Hinkle.



The seven-seater all-metal biplane Aeromarine flying boat (Liberty) of the Fitchfield Air Transport Ltd. and in the water in Roan, P. Q., in connection with cargo moving.

The Kentucky Cardinal Commercial Airplane

New Kentucky Airplane Company Develops Three-Place Commercial Plane With Novel Wing Features

THE KENTUCKY Cardinal, the result of two years' intensive research and considerably full scale flying, has recently been placed on the market by the Kentucky Aircraft Corporation, of Owensboro, Ky. The novel experimental plane produced by this company was flown last August and, while no exact figures are available as to performance, the plane has climbed 1,200 ft. in 23 sec., and the top speed is estimated to be over 180 m.p.h. Both of the experimental planes were given extensive coast-to-coast flying tests and all necessary target shots have been completed in the model which is now in production.

Wing with Single Spar

The Cardinal differs from the many experimental airplanes in that the lower wing has a very small chord and only a single spar. The advantage in this, it is claimed, is that the velocity is greatly increased, not only because the lower wing is small, but because it has less resistance to the upper wing, placing it more nearly in line with the air flow. Throughout the design, every effort has been made to increase the streamlining and lower the resistance rate of the plane. The arrangement of the two passenger and pilot's seats is unconventional, but there has also been improvement in the plane as an entire fact begins to manifest.

The control system is as nearly fool-proof as is possible. The elevator and the ailerons, which extend the full length of the upper wing, are operated by pull and push rods from the controls. The rudder control wires are greatly increased and do not touch any portion of the structure.

Steel Fuselage

The fuselage is of welded steel tube construction, with no frame wires, and the engine mounting and landing gear are arranged that any part of the engine is almost instantly accessible. The tail surfaces and ailerons are also of steel tubing and the wings are of the conventional wood construction.

The steel winging test sled and the cold air test landing gear are extremely rugged and simple. The shock absorbing unit is easy to replace and the design of the landing gear is such that there is no marked landing action and no perceptible rebound of the plane after a hard landing.

The gasoline tank is located in the center section, giving a greatly fuel system to the engine, on O.S.B. The tank can be removed very easily by loosening two straps and taking off one supply. The gasoline tank is made of brass plate, is perfect in its gliding dimensions and is welded aluminum, and it can be easily repaired.

It is claimed that this plane will not spin and that there is adequate lateral control for beyond stalling angle.

The Kentucky Aircraft Corporation completed its organization in December and was incorporated under the laws of the State of Kentucky by a constitution of \$200,000. Work on the company's first design started Jan. 8, and it is expected that it will be completed about March 1.

Britain Prepares Schneider Seaplanes

It is reported that three types of racing seaplanes are now under construction for the British Ministry with a view to providing a British entry for the 1939 Schneider Trophy Race. The best known of these, designated as the S.1, is very similar to the Italian S.10 and is powered with a Napier engine known as the Schneider type. (Econ. 459) It is the opinion of some to be generally held that Great Britain should be very effort to win the cup in 1939 for reasons of international prestige. It is highly probable that other and more improved designs will be constructed before the date of the next Schneider event.

Seville-Buenos Aires Airline

A consensus to establish an airline between Seville and Buenos Aires has been approved by the Spanish Council of State to the Spanish Colon Transports Expedients. The service will be carried out with airplanes with capacity for forty passengers and two tons of freight. On each voyage there will be two passengers and 500 kilos must be reserved for the Spanish Government. Monthly service, which will be later made weekly, must be interrupted while some peace and an export must be constructed by the company of Seville. A state subsidy has been granted, which will be canceled if the law is not successful.



The Kentucky Cardinal three-place commercial airplane. (Curtis GX-3)

Side Slips

By JOSEPH B. GARDNER

It is extremely interesting to note the announcement that the British Air Ministry is taking a new experimental instrument, working on the gyroscope principle, and having red and green instrument sectors on a dial to indicate in the pilot's cockpit as to whether he is maintaining a straight course through fog and darkness. The frequent announcement of new instruments from the inventors of the instruments, which, after inspection, seem almost indispensable in the proper piloting of the airplane, make us wonder what the instrument board of the future is going to look like. It would be very long ago that the sole instrument a pilot would use is a hand compass to tell him whether or not there was too much wind for flying, and nowadays the well equipped airplane seems to need instruments and devices enough to fill out a couple of testing laboratories. A friend of mine recently expressed a way a set of very dark glasses and claimed that his own could be permanently ignored. He said he had been given a demonstration ride in the "blue case" airplane, and had tried to watch the instruments during a spin. He thought it would be a good idea to mark out some sort of an automatic device which would cover the entire instrument board during the more intricate maneuvers.

A prominent strip expert is quoted as having said in a recent speech, "A strip expert would not narrow the dimensions of the plane that a small business man, instead of going to Western Park in his car, could buy off in an air mail for the Humber or Buick. After with equal ease." We fear that the gentleman's knowledge of strips is far more up-to-date than his information regarding the Ford business man in view.

few test business men have visited Niagara Falls since my last in the "Blue Heaven". The idea may be found in great quantities today in Atlantic City and other pleasure resorts of the East and West coasts, and while it might be possible for him to "hop off for the Humber or Buick with equal ease", we doubt that he could be persuaded to do so unless these resorts were taking up better hourly counts.

A news article in a New York newspaper, talking of the new air conditions, states that "No night plane must carry a red light as far right and a green light on the left." Mr. O.A.P., who has flown a great many miles in planes having a red light on the left and a green light on the right, thinks that this rule must be changed to take care of reversed light conditions.

We've always suggested that we couldn't write over the simplest graph, so it seems that every column which professes to be a column should be qualified. Heavily with bits of thought and subjectivity, there is a while a friend seems to use common sense, however, with a beautiful bit of sentiment is posted from. All of which is by way of introduction to the verse from M. R.E.C. entitled "Where Is My Wandering Lover's Light?"

Our Henry took his shorter glass,
Aiming at a storm of rain,
That engine trouble did develop
And now he needs a little help.

If the danger used in this material has any resemblance with the rest of the story, it is probable that there will be further than ever in the near future. A New York offering house referred to women in advertising a new print which called "My Bird" which features vacation plans flying around in clouds in the clouds.

The average fan is a somewhat unorthodox individual and it would be interesting to see the motion if he noticed his wife running a dress with the design printed on "bird" legs.



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SIDNEY, NEW YORK



Dutch Air Company Reduces Operating Expenses

A considerable reduction in cost per ton per kilometer of goods and passengers transported in planes of the Royal Dutch Air Lines has been achieved by that company.

In 1933 the cost per ton of the company's operations amounted to 6.68 florins (\$1.52) while in 1936 it had been reduced to 3.30 florins (\$0.54). According to the Manager of the Royal Dutch Air Lines, commercial operations of that plane can be accomplished in a profitable form if the cost per ton per kilometer can be reduced to 3.00 florins or \$0.50 cents. In view of the reduction in costs from \$1.52 per ton to \$0.54 per ton over a period of six years it is believed by the company that, assuming a proportionate decrease in the labor, fuel and other expenses, one can be expected profitably by 1938, eight years after the beginning of the air service. It, however, no investment or other indirect permit of a more rapid reduction of operating expenses the rate of 50 Dutch cents may be needed before that time.

The fact that the line in Holland must fully supply two flying stations, one at Amsterdam and the other at Rotterdam, adds greatly to the operating expenses of the company, it is said. The Royal Dutch Air Lines now operates on a fleet of 1,000,000 ton-kilometers and it is stated that it must reach 2,000,000 ton-kilometers in order to make a profit. It is also stated that the establishment of an air postal line to the East Indies would permit this figure to be reached. It has been proposed to establish a service from Holland to Colombia and from Colombia to Bolivia, Java.

A Dutch committee interested in the development of the Netherlands Indies air service is reported to have submitted plans for a flight from Amsterdam to Sumatra during the present year.

France to S. America Air Line Projected

Creation of an air line between France and South America in 1937 by a French carrier is reported to have obtained preliminary sanction, due to the submission of an increased sum for "air mail service" in the French budget for next year. The finance committee of the Chamber of Deputies approved this sum early in December, and it is expected finally that it will pass before the end of the year.

The increased sum for air mail service amounts to 3,500,000 francs (about \$555,000). The sum of 1,000,000 francs is destined for the air line Cape Verde-Verde-Verde-Pernambuco-Brazil-De Janeiro-Santos-Areas, which will be a prolongation of the present French line Toulouse-Casablanca-Dakar, operated by the Air France company. The complete line is expected to France to be in operation with one stop per week in each direction, by July 1, 1937. The Casablanca-Dakar stage will be made by airplane, Dakar to Cape Verde by seaplane; Cape Verde to Kourou by fast boats, Kourou to French Guiana by seaplane, and French Guiana to Brazil Aires by airplane. This last section of the route will be operated in cooperation with the Brazilian Aeronautical Transportation Company.

Observers in France state that the early summer of 1937 probably will see a race to establish aerial connections between Europe and South America. They say that German and Spanish interests already have joined their efforts in this end, and that the increased budget allocation will permit the French to enter the race with expenditure of winning.

The additional million francs in the proposed budget is said

to be for the purpose of assisting in the eventual losses of the French line to England with the British line passing on to India.

Trieste-Turin Air Line Suspended

Because of the heavy loss frequently encountered in the Po Valley, the Trieste-Turin Air Line was suspended on Oct. 15. To compensate the surprise, the company has arranged new service between Trieste and Venice and Trieste and Rome. The Trieste-Venezia service makes two flights daily, leaving Trieste, leaving fifty minutes. The line is 120 km and a 35 per cent reduction for return journey. The Trieste-Rome line makes a daily flight, leaving Trieste, leaving Trieste and Lampedusa. The three are: Trieste-Rome 120 km, Trieste-Lampedusa 160 km, Trieste-Rome 250 km, with a 35 per cent reduction for return journey.

British Aeronautical Imports and Exports

The following figures represent imports and exports of aeronautical material from Great Britain, from January to October, 1935 and 1936:

	1935	1936
Imports	£ 1,710	£ 1,240
Exports	£ 4,730	£ 5,111
Per Cent	14.10	21.21

It will be noted that imports for 1936 greatly increased as compared with 1935, and that exports for 1936 have fallen below the corresponding figure for 1935.

Aviation in Mexico

The Mexican Ministry of Aviation, of Tampico, has made \$480,000 in making a total of 200,000 kilometers from the time of the organization of the company on Oct. 1, 1934, to May 30, 1936. This is the only aviation company in Mexico doing regular commercial flying. The company now has five planes in service, all of which are Canadian. It operates with 200,000 kilometers. On Dec. 8, 1936, a pilot of the company, with two passengers, made a trip from Mexico City to Matamoros, opposite Brownsville, Tex., in the same day. The plane took off from Mexico City at 8:40 a.m., and landed at Matamoros at 9:30 a.m. It left Tampico at 1:40 p.m., arriving at Matamoros at 4:45 p.m. The air distance traveled was about 600 miles.

France Concerned Over Loss of Internal Air Lines

Increased attention is being given in France to projects for a series of internal airlines, connecting principal cities. With Chamberlain of Germany seriously interested, study is under way of them to connect Lyons and Bordeaux, Lyons and Clermont-Ferrand, Paris and Dijon, and Toulouse and Paris. A recent visit of French authorities to Germany, and the report they brought back of the interest of internal airlines which cover that country from one end to the other have especially aroused the French to new efforts. Success of international trunk lines, of which France has four, is proportionately dependent upon an efficient system of feeder lines, to which France thus far has been very deficient.

Cirrus Engine Enlarged

The new Cirrus II engine as compared with the Cirrus I, has been slightly enlarged and with improved cylinder heads and modified rods, shows an increase in maximum power from 55 hp. to 64 hp. at 3,000 rpm. The total weight remains approximately the same at 195 lb.



Boston, Mass.

By Daniel Redford

During the first week of January the Army, Navy, National Guard, and commercial operations of Boston were all busy. The pilots of the Army medium and transport totaled 15 hr., 45 min. The National Guard pilots added 9 hr., 15 min. The Navy fliers ran up 9 hr., 30 min. additional. The civilian total 5 hr. completed the last flying. The Boston Airport Corporation had one Travel-Air OX-5 on the line, that being the only Boston commercial plane flying at present.

The Boston Airport Corporation passed through a hard and painful first year and emerged with an experience and a commercial larger, within graduated students and teacher people serving as staff. B. F. Holdings in the aviation field and general aviation.

At a meeting of all flying groups held in Boston, recently a joint bill for the expansion of the number for flying at the airport was drawn up and has been passed in the Massachusetts legislature. The present runway is 1,500 ft. long and 300 ft. wide. Only one plane can land at a time. The bill would permit the present four hangars of the army and navy and the one commercial hangar to be built on the side of the field to allow for further expansion.

A plan for coordinating federal, state, and municipal air traffic in Massachusetts through creation of a New State Institute committee similar in nature to that created in Connecticut, has been included in a bill to be presented to the Massachusetts legislature by the State American Legion Aviation Committee.

sets legislation by the State American Legion Aviation Committee.

Have ground school classes kept at MIT Tuesday evening Jan. 13, and are to continue Tuesday and Thursday evenings next April. The classes are voluntary.

The National Guard fliers now have a Douglas O-2 as part of their equipment. It was flown to Boston by Lieutenant Colonel Haskins from Santa Monica, Cal. the first of the year. It used by way of tests and had 30 hr. flying credits. First Lieutenant Frank C. Crozier, Boston instructor, is on his fourth solo duty at Selfridge Field, Mich.

Colonel Art Thompson, Inc. has operated the mail planes as well out of Boston. All Water aeroplanes, being held up only one or two days by fog. No formal landings due to mechanical delay here taken place, but no less has been lost. The air mail company is expected to jump in volume with the new air field of the state per half hour due Feb. 1. During the first week of January the air mail from Boston carried an average load of fifteen 25 lb. into Boston and two 5 lb.

A flying club at Tufts College is being formed through the leadership of Fred Ralph, a graduate of the primary flight school at Hampton, and a member at Tufts.

Kansas City, Mo.

By T. C. Crow Jr.

The LeGrange-Orritt Aircraft Company, of Kansas City, was recently formed by Tex LeGrange and Fred E. Orritt, Jr. The

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125 Pair of Crankshafts
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NEW YORK CITY

Company is the distributor of Waco planes and also handles a complete line of aircraft accessories. It operates from Reister Field.

There has been considerable flying activity in and around Kansas City during the past few weeks, due to the exceptionally good weather conditions.

Cincinnati, Ohio

By T. H. Hughes Leary

Lansing, Michigan, the government-operated field, just first and a greater order from the division office of Cincinnati, is the home field and office of the Reister-Kilbicki Co. This field is under the direction of Major R. L. Hadden, Army Air Corps. The Reister-Kilbicki Co. has flown during 1936 a total of 727 hrs. has earned 1550 passengers and has received \$2,000 orders. It brought in Cincinnati the Commercial Reister-Kilbicki T-2 and General Smith, pilot of the T-2, the Reister-Kilbicki T-2. On July 4, 1936, it is reported to have earned 10,000 pounds the weather of several flights, 3,800 ft. over Cincinnati. On July 20, 30,000 people witnessed the display at Springfield, Ohio, and 10,000 at Middletown, Ohio.

Reister-Kilbicki Co. has used its quota of Waco in Ohio and Kentucky and county passengers are selected with their planes and the prompt and courteous service rendered at the field. The company has also in its credit about 10,000 dollars which have been turned to fly and have received their diploma for safety for 100 miles of flight.

John W. Patterson, vice president of the Union Central Life Insurance Co. of Cincinnati, owns a Waco plane, in which he visited in June 1935, and has been rated even airport station a million of 100 miles of flight.

St. Joseph, Mo.

Revenue Field, St. Joseph's field airport, has now completed payment on its \$45,000 field. The equipment, inspection and purchase of this airport represents an expenditure of \$118,000.

Baine, Idaho

Comdr. Jackson Barker, at Post No. 4, American Legion, has approached Harold McDowell, Lem Caldwell, Lloyd C. Thompson, Gordon Smith, El D. Gregory, Victor Wengrich and W. B. Galt, members of a committee to study the development activity of the landing field to accommodate large airplanes and passenger carrying planes.

It is expected that by the summer Baine will be called upon to take care of big airplanes.

Florida Mail Service Awards Bonuses

Operator of Contract Air Mail Route No. 18, Atlanta to Miami via Miami, Jacksonville, Tampa and Port Royal, by Florida Airways, Inc., was generously rewarded on Dec. 21 with the air route from South Florida to New York has held the service, affording the offices of Florida and Georgia an overnight air service to Ocala. The temporary award was given by the Florida Airways Co. on the advice of the Post Office Department after nine months of successful operation of this southern airline.

Immediate steps are being taken by the Department of Commerce to light the air route from Florida to New York via Atlanta according to orders from Washington, construction work being held up awaiting federal appropriation. With the maintenance of route lights and field houses along the air mail route of Florida Airways, Florida Airways officials state that planes will leave South Florida after the 5th of each month of service and general posting of mail matter, arriving in New York in time for the next office delivery the following morning.

Following the recent opening of bills by the Post Office Department on the Atlanta-New York line, this line will connect with the Florida Airways route, the two routes to open on the maintenance of route lights and field houses along the entire Atlantic Coast. Officials point out that, under the present schedule and with no air mail connection North of Atlanta, the Florida and Georgia public was not receiving the

rightful efficiency of this ultra-modern service and would not receive this efficiency unless day and night operation were provided. It is now necessary for the planes to leave South Florida daily, as the morning in order to reach Camden, Tenn., Atlanta, before darkness.

The temporary suspension of the route twisting the installation of lights has been pointed out as the impact and most noticeable means to prevent delays. The fact that the operation of the Florida Airways line since April 1 has been successful with the greatest success. With the operation of the air line through to New York it is presumed that the air mail dispatches will be made with transportation profitable in view of the fact that the air mail route along U.S. No. 30, including some other, has shown an increase each thirty-day period since it was inaugurated and with no real time being involved.

The new air mail route recently announced by the Post Office Department and effective Feb. 1, of 1937 route per contract comes to any point in the United States should open a capacity load for many air mail lines in the country. Major Fred Chase, Inc., president of Florida Airways, believes "The new mail route rules and air mail flying service will place the American air mail dispatches in line to direct delivery and in many instances even to night-flight service."



Patient Transported by Plane

The Army Air Corps in Panama on Feb. 1, called upon to transfer patient General Contreras. An aged man had been brought from his home in Chicago recently in the Republic of Panama to the hospital in Panama City for treatment. Six

men advised that nothing could be done to improve his condition and that his death was only a matter of a short time. He immediately requested that she be removed by airplane to her home to be strong her own people. This request was transmitted through the American Minister and granted by the Army authorities and she was placed on a cot in a Martin Bomber and the 100 mile trip to her home covered in less than four hours, the patient being none the worse.

New Aircraft Material Needed

An anti-current development which has been undertaken jointly by the Ordnance Department and the Coast Artillery office extensive study, practically everything is new, and all the fire control methods as well as the guns had seen in use during the World War, on the opinion of the officers qualified to judge should be replaced entirely in the near future.

The material which has been under development consists of guns of about 5 inches in caliber, both mobile and fixed, machine guns of 30 and 50 caliber, and high power mobile search lights.

Experimental types of the European were given very thorough tests in service at Alcatraz Prison, Nevada during September and October last.

Seventh Corps Area Headquarters Moved

The headquarters of the Seventh Corps Area of the Army have been moved from its old office building in the City of Omaha, Neb., to Fort Omaha, on the same with the Department of War measured, Jan. 5.

Major General Benjamin A. Power, commanding the Corps Area, returned the Department in this office, stating that the movement was made on Jan. 1.

Air Corps Officers Promoted

Four recent promotions of the Air Corps recently designated, then held here for seven days. The officers, and the dates from which they will read, are as follows: Herbert Mennick,



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A FEW years ago men had to learn about aircraft from personal, costly experience. They had no one to guide them—no one to point out mistakes where they were made—and therefore years were spent learning what takes months now. **TWO-BRODER — PRACTICAL TRAINING**

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Nov. 9, Drilling Whitten, Nov. 14, Lynna P. Whitten, Nov. 20, and Elmer W. Purpura, Nov. 24.

Army Air Orders

See Lt. Col. Francis E. Galkin, Air Corps (Corps of Eng.), referred from duty in Air Corps, and further duty in Air Corps, and is detailed at George Institute of Tech., Pittsburgh.

First Lt. Basil C. Moffat, Air Corps, McCook Field, is Walter Reed General Hosp., Washington, for maintenance and further observation.

Capt. Thomas Roland, Air Corps, detailed as a member of the board of officers, to meet at Randolph Field, Texas, for the purpose of examining candidates for appointment to second lieutenants in the Air Corps, Regular Army. Major Henry H. Arnold is referred.

Capt. George G. Parks, Inf., detailed in the Air Corps. Captain Parks is referred from assignment to the 335 Inf.,

and from Fort Douglas, Utah, and will proceed to Brooks Field, reporting to the com. Air Corps Prov. Fly. Bde.

First Lt. Russell C. Winkler, Cdr., detailed in the Air Corps, Lieutenant Winkler is referred from assignment to the 3114 Cdr. and then station and duty at Pensacola, Fla., and will proceed to Brooks Field, reporting to the com. Air Corps Prov. Fly. Bde.

Capt. John W. Thompson, Inf., detailed in the Air Corps, Captain Thompson is referred from assignment to the 15th Field Art., and from station and duty at Fort Sam Houston, and will proceed to Brooks Field, reporting to the com. Air Corps Prov. Fly. Bde.

Capt. Calvin E. Griffin, Air Corps, Redwood Field, to report to Brig. Gen. Richmond P. Davis, U. S. A., for consideration by the Army referring board. Upon completion of his examination, Captain Griffin will return to the place of assignment by him of order.

See Lt. Col. Francis G. Auland, Quartermaster Corps, is detailed in the Air Corps, and upon completion of tour of duty (Continued on Page 187)



The submarine plane S.T., piloted by Lt. Delph C. Allen, leaving the portable catapult deck of a submarine.

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AIRCRAFT DESIGN COMPETITION

In order to encourage the development of aviation and to improve the efficiency of naval aviation, an act authorized by Act of Congress, Public No. 445, approved July 2, 1936, the Secretary of the Navy invites the submission in competition, by naval construction, of designs for rigid airships or approximately an inflation rubber boat rubber, suitable for use as adjuncts to the Fleet.

Prospective competitors will be furnished identical specific instructions as to the conditions and requirements of the competition and as to the various features to be developed, together with the negative measures of merit that will be applied in determining the merit of the designs submitted in competition. While the competitors must not contemplate that a design of a structure as contemplated as an airship shall be completely worked out, it does require that, for a design to merit consideration, competitors must submit sufficient drawings, calculations, supporting data, and model construction to permit intelligent analysis and appraisal of the merit of the design. It will not be sufficient for a competitor to submit a few words or sketches descriptive of an idea.

The competition anticipates the placing of a construction contract with the winner of the competition, provided funds are available by the time the competition is ended. In any event, the sum of \$50,000 is available for the purchase of a winner's design. The airships must be constructed in the United States.

All designs and accompanying data must be placed in the mail not later than midnight May 16, 1937.

Information will be furnished upon application to the Bureau of Aeronautics and Aeronautics, Navy Department, Washington, D. C.

CHARLES MORRIS
Inspector General of the Navy

PRIVATE OPERATORS made the discovery that airplanes engineered to meet the exacting requirements of the POST OFFICE DEPT. were more economical to keep up and operate than many so called, "Commercial Ships."



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Considering that the initial cost was no higher, it was well worth their time investigating the superiority of RYAN M-1.

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